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DAVID J. NEWTON ASSOCIATES
INCORPORATED

Civil and Geological Engineering Services

August 21, 1987

Marsha Bailey
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

SUBJECT: Pacific Wood Treating Corporation, RBT Site, Geotechnical Investigation Plan.

Dear Marsha:

Thank you for returning my call on Friday, August 21. As we discussed, our firm is prepared to implement a geotechnical investigation of subsurface soil and ground water conditions at the subject site. We have been engaged by Pacific Wood Treating Corporation to perform this work, and we are working closely with Hazard Management Specialists, Inc.

We are investigating the site one step at a time. The first step is to identify the permeability and water bearing characteristics of the silt and clay soils between the ground surface and the top of gravel deposits (reportedly the Troutdale Formation) that underly the site at depths of 30 to 50 feet.

It is postulated that saturation conditions develop seasonally on the top of the gravel deposits to result in a temporary water bearing zone. The regional aquifer used for water supply is located in the Troutdale Formation some 150 feet below the possible seasonal water bearing zone. A question that has been raised is whether or not the seasonal zone, if it exists, and the lower regional aquifer are connected.

The significance of this question depends on the existence of a vehicle to transport possible contaminants from the surface of the site down to the top of the gravels at the 30 to 50 foot depths. Therefore, to more fully understand the site conditions and identify an appropriate monitoring system, the permeability and water bearing characteristics of the silts and clays in this upper interval must be identified.

It is possible that no hydraulic connection exists between the ground surface and the underlying gravels, and possible seasonal saturation zone at the top of the gravels. If this is the case, monitoring requirements should be determined accordingly. If hydraulic connection is found to exist, then consideration must be given to the seasonal saturation zone,

and the possiblity of connection with the deeper aquifer for monitoring.

The objective of our investigation is to better understand the characteristics of the upper soil deposits, determine if water that could transport possible contaminants is present in these materials, and determine if there is hydraulic connection between the ground surface and the top of the gravels. Characterization of the soil materials will be done by laboratory testing of representative samples to determine grain size distribution, density, moisture content, amount of silt and clay in the samples, and permeability. Moisture content and density determinations will be made in the field to compute the degree of saturation of samples. This will help identify saturated zones that may exist on a timely basis.

We plan on penetrating the gravels approximately 5 to 10 feet to determine if the top of the formation has been weathered to form an impermeable cap. The need for deeper investigation and monitoring well installation into the Troutdale Formation should be developed according to the results of our investigation outlined above. If hydraulic connection between the surface and the seasonally saturated zone is not a realistic condition, a shallow monitoring system to verify nondispersive characteristics of soil moisture could be a reasonable solution.

A copy of the proposal for our services is enclosed for your review. This will help you understand the basis for our investigation approach to determine an appropriate level of monitoring for the RBT site.

Drilling will start Monday morning, August 24. If you can get down to the site, we can go over specific details then. Otherwise, I plan to keep you informed of findings and conclusions that develop.

The investigation plan was discussed with Robert Farrell on August 20. His feeling about the plan is positive and he gave us some good inputs.

I hope you can make it down to the site.

Very truly yours,
DAVID J. NEWTON ASSOCIATES, INC.

David J. Newton, P.E., C.E.G.
President

PROPOSAL FOR GEOLOGICAL AND GROUND WATER SERVICES

PACIFIC WOOD TREATING CORPORATION RBT SITE

RIDGEFIELD, WASHINGTON

AUGUST 14, 1987

STATEMENT OF PROJECT

Wood preservation compounds have been used on the Ridgefield Brick and Tile site in the past. Waste materials were concentrated as sludges and were incinerated with other nontoxic materials. The resulting ash was stockpiled on the site and later disposed of in a liner equipped landfill constructed in an existing clay pit at the site.

Although waters sampled from the landfill toe drain indicate an insignificant level of impurities associated with the landfill contents, the Environmental Protection Agency is concerned about potential ground water contamination from the landfill, or perhaps from residual compounds that might be present in the soils on the site. Accordingly, Pacific Wood Treating Corporation is subject to an EPA directive to characterize ground water conditions beneath the site and install a ground water monitoring system before the end of the year.

The objective of the EPA directive is to be provided with a mechanism that demonstrates the following:

* Water quality beneath the site and the presence of contaminants, if any, at the present time.

* Changes in water quality beneath the site over time.

* The geological characteristics of the site and associated behavior of the ground water system.

Specifically, the EPA will require the installation of monitoring wells into the uppermost aquifer. Our characterization of geological conditions at the site will identify the level of monitoring that is appropriate to the actual subsurface conditions at the site.

SITE CONDITIONS

There are two significant strata beneath the site. The upper

30 to 50 foot strata consists of silt and clay. The lower strata, identified as the Troutdale Formation, consists of gravels and sands, with some silts and clays. The principle aquifer in the site area is believed to be located in the Troutdale Formation.

It has been postulated that a seasonally saturated conditions develops on the top of the Troutdale Formation. The top of this formation is thought to be irregular and could result in local ground water accumulations. Since this is a seasonal condition, the accumulated water must migrate either laterally along the surface of the Troutdale Formation, or vertically into the Formation. If vertical percolation of this water into the Troutdale Formation is occurring, then there is hydraulic connection between the top of the formation and the regional aquifer within.

The question of whether lateral or vertical migration is occurring at the surface of the Troutdale Formation is significant only if a vehicle exists to transport possible contaminants from the ground surface down 30 to 50 feet to the Troutdale Formation. With the prevalence of fine-grained soils in the uppermost strata, is there sufficient percolation beyond the moisture holding capacity of the soil to support an advancing seepage front? Only if this condition exists, can surface contaminants be carried from the ground surface down to the Troutdale Formation.

Therefore, there are four possible combinations of subsurface conditions that apply to the site:

1. <u>No transport water in the uppermost strata/separate, unconnected aquifers.</u>

   If this condition exists, contaminants are not being transported down to the aquifer from the ground surface, and the accumulated water on the top of the Troutdale Formation originates off the site, and leaves the site by lateral migration.

2. <u>No transport water in the upper strata/connected aquifers.</u>

   If this condition exists, contaminants are not being transported down to the aquifer from the ground surface, and the accumulated water on the top of the

Troutdale Formation is merely a reflection of the seasonal flucuation of the regional aquifer in the Troutdale Formation.

3. Transport water exists in the upper strata/separate, unconnected aquifers.

   If this condition exists, contaminants, if they are present, could be transported downward to the top of the Troutdale Formation. This accumulated water could be from direct surface recharge, offsite sources, or a combination of both. Under this condition, the accumulated water would leave by lateral migration.

4. Transport water exists in the upper strata/connected aquifers.

   If this condition exists, contaminants, if they are present, could be transported downward into the Troutdale aquifer.

The purpose of our site characterization is to determine which of the above 4 conditions exists. The results of the site characterization will provide the basis for an appropriate and minimal monitoring program that can be tailored to answer the essential questions.

PROJECT APPROACH

In order to determine if transport water exists in the upper strata, soil samples will be obtained and tested for grain size distribution, permeability, moisture content, degree of saturation, plasticity and classification. In addition, the presence of water bearing zones that could transmit seepage water into the landfill will be determined by extending several test holes near the perimeter of the landfill. If the moisture content is found to be less than the moisture holding capacity of the soils, and the permeability rate demonstrates that at least several seasons are required for transport water to travel through the full depth of the surface silts and clays, and there is no current contamination of the ground water, then there would be a strong argument for downgrading the extent of the monitoring system.

In order to determine if the aquifers are hydraulically

connected, test holes will be extended into the Troutdale Formation. The permeability of the Troutdale Formation will be determined by borehole testing. Two independent piezometers will be installed in each test hole to determine the relationship between the accumulated water on the top of the Troutdale Formation and the regional aquifer within the Formation. If it is determined that the amount of transport water is minimal, then this question of whether these two aquifers are connected becomes academic. Nonetheless, the permeability tests and the piezometer relationships should give us enough information to answer the question about hydraulic connection without the expense of pump tests.

PROJECT WORK PROGRAM

A. Definition of Subsurface Conditions

The presence of transport water in the uppermost silt and clay strata, and the capability of the soils in this strata to allow sufficient transport water to penetrate the full thickness will be determined by continuous sampling as the borings are extended to the Troutdale Formation. The samples will be obtained by standard geotechnical engineering procedures using a split-spoon, or shelby tube sampler. These samplers provide soil samples that are relatively undisturbed.

The undisturbed samples will be examined to determine fabric and bonding characteristics of the soils beneath the site. These characteristics have a major role in the capacity of the soils to hold, as well as transmit water. Laboratory tests will be performed on the undisturbed samples to determine permeability, grain size distribution, plasticity, moisture content, density, specific gravity, and moisture content at field capacity.

The results of the tests and field observations will determine if transport water is present, and if transport water can percolate to the Troutdale Formation. A key soil characteristic that will be identified is the field capacity moisture content of the soils. This is the amount of moisture that a soil will retain against the force of gravity. Therefore, a certain quantity of moisture percolating into a soil is retained in the soil structure. Before continuous percolation can be achieved, this moisture requirement must be

satisfied, the voids must be filled, and sufficient additional water must be available to maintain percolation. If soils beneath the site are below the field capacity moisture content, and the permeability values are in the 0.0001 to 0.000001 cm/sec range for silts and clays, it becomes obvious that penetration of the upper strata by transport water is not occurring, or takes many seasons, and monitoring should be implemented on a commensurate basis.

This aspect of the subsurface investigation is a key element of the monitoring requirement for the site. Therefore, emphasis will be placed on detailed logging of the borings in the uppermost strata to determine the water transport characteristics of the soils, including layering, types of materials in layers, thickness of layers, consistency of layers and soil types across the site, and moisture condition at the time of extraction from the ground. The moisture conditions will be identified in the field as dry, humid, moist, or saturated based on written definitions for each category. These conditions will be logged relative to depth in the boring and type of soil. Laboratory tests will reflect actual moisture content and degree of saturation. These results will determine if seepage zones exist that could drain into the landfill, and help answer the question about soil capacity to transmit water from the surface to the Troutdale Formation.

Drilling in the uppermost strata of silts and clays will be done with a flight auger. This is truck-mounted equipment operated by crews experienced in sampling subsurface soils for site characterization purposes.